UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,764	03/26/2004	David J. Love	TI-35144	9069

23494   7590   05/14/2010
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EXAMINER
JOSEPH, JAISON

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
05/14/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS,
WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>29 January 2010</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-20</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
         application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

Response to Arguments

Applicant's arguments filed on 1/29/2010 have been fully considered but they are

not persuasive.

Regarding claims 1- 20, applicant argues, "A point multiplication in the FFT

domain is not equivalent to a convolution it is equivalent to a circular convolution."

However the office respectfully disagrees. Further Kamen et al further teach that

convolution in time domain is equivalent of multiplication in frequency domain (see page

186). Therefore convolving the weights in time domain as taught by Ketchum is

functional equivalent of multiplying the weight in frequency domain as described in the

specification. Therefore it would have been obvious to an ordinary skilled in the art at

the time the invention was made to use frequency domain multiplication instead of time

domain convolution of Ketchum. Therefore Ketchum et al in view of Kamen et al and

Barry et al. teach all cited limitations. Therefore the claims remain stand rejected.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims rejected under 35 U.S.C. 103(a) as being unpatentable over Ketchum et

al (USPAP 2003/0108117) in view of Kamen et al (Fundamentals of and Systems Using

Web and MATLAB, second edition, Prentice Hall 2000, pages 186 - 187) and further in
view of Barry et al. (US 2003/0031264).

Regarding claim 1, Ketchum et al teach a waterpouring system for use in an with
a multiple-input, multiple-output (MIMO) transmitter, comprising: an encoding decision
subsystem configured to select a constellation combination based on gains in channels
of said MIMO transmitter (see figure 1, controller 130 and figure 2, and paragraph 54
and 55) an; a vector modulator subsystem, coupled to said encoding decision
subsystem, configured to modulate a fixed number of bits in a bit stream with said
constellation combination to generate a symbol vector (see figure 1 and 2, and
paragraph 57); and a normalization and precoding subsystem, coupled to said vector
modulator subsystem, configured to weight said symbol vector based on said gains to
yield a weighted symbol vector and distribute said weighted symbol vector among said
channels (see figure 1 and figure 2, component 120a and paragraph 59 –74).

Ketchum does not expressly teach the normalization is taken place in frequency
domain. Ketchum teaches that the normalization is done in time domain (see the
convolver). It is well-known in the art that the convolution in time domain is equivalent to
multiplication in frequency domain. Further Kamen et al further teach that convolution in
time domain is equivalent of multiplication in frequency domain (see page 186).
Therefore convolving the weights in time domain as taught by Ketchum is functional
equivalent of multiplying the weight in frequency domain as described in the
specification. Therefore it would have been obvious to an ordinary skilled in the art at
the time the invention was made to use frequency domain multiplication instead of time

domain convolution of Ketchum. The motivation of suggestion to do so is to reduce the transmitter complexity. The combination of Ketchum and Kamen et al does not expressly teach the does not rely on feedback. However in analogous art, Barry et al teach a waterpouring system that uses no feedback (see paragraphs 28 and 33). Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to have a system does not rely on feedback. The motivation or suggestion to do so is to increase usable data rate.

Regarding claim 2, which inherits the limitations of claim 1, Ketchum et al further teach wherein said encoding decision subsystem is configured to select said constellation combination from a set of constellation combinations constituted from at least one modulation technique selected from the group consisting of: quadrature amplitude modulation, and phase shift keying (see paragraph 0057).

Regarding claim 3, which inherits the limitations of claim 1, Ketchum et al further teach wherein said gains are configured to be reflected in an ordered, real diagonal matrix (see paragraph 25).

Regarding claim 4, which inherits the limitations of claim 1, Ketchum et al further teach wherein said encoding decision subsystem is configured to select a maximum-rate sub-channel constellation and a corresponding gain that encodes a number of bits based on a transmission capacity (see paragraph 0057).

Regarding claim 5, which inherits the limitations of claim 1, Ketchum et al further teach wherein said weighted symbol vector is configured to have an energy equaling a total transmit energy of said MIMO transmitter (see abstract).

Regarding claim 6, which inherits the limitations of claim 1, Ketchum et al further teach wherein said normalization and precoding subsystem is configured to distribute said weighted symbol vector along an orthogonal right singular vector of a matrix representing said channels (see abstract and paragraph 59 –74).

Regarding claim 7, which inherits the limitations of claim 1, Ketchum et al further teach wherein said MIMO transmitter is configured to form a part of a selected one of a narrowband wireless communication system employing multiple antennas, a broadband communication system employing orthogonal frequency division multiplexing, and a multi-user communication system (see abstract).

Regarding claim 8, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 1 is applicable hereto.

Regarding claim 9, which inherits the limitations of claim 8, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 2 is applicable hereto.

Regarding claim 10, which inherits the limitations of claim 8, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 3 is applicable hereto.

Regarding claim 11, which inherits the limitations of claim 8, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 4 is applicable hereto.

Regarding claim 12, which inherits the limitations of claim 8, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 5 is applicable hereto.

Regarding claim 13, which inherits the limitations of claim 8, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 6 is applicable hereto.

Regarding claim 14, which inherits the limitations of claim 8, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 7 is applicable hereto.

Regarding claim 15, Ketchum et al teach a multiple-input, multiple-output (MIMO) transmitter employing an input bitstream, comprising (see figure 1): a plurality of transmit channels (see figure 1); and a waterpouring system, including: an encoding decision subsystem that selects a constellation combination based on gains in said transmit channels (see figure 1, component 130), a vector modulator subsystem, coupled to said encoding decision subsystem, that modulates a fixed number of bits in said input bitstream with said constellation combination to generate a symbol vector (see figure 1 component 130, 114, 120, and figure 2, components 114a), and a normalization and precoding subsystem, coupled to said vector modulator subsystem, that weights said symbol vector based on said gains to yield a weighted symbol vector and distributes said weighted symbol vector among said transmit channels (see figure 1, components 114, 120, 130 and figure 2, component 120a and paragraph 55 – 74).

Ketchum does not expressly teach the normalization is taken place in frequency domain. Ketchum teaches that the normalization is done in time domain (see the convolver). It is well-known in the art that the convolution in time domain is equivalent to multiplication in frequency domain. Further Kamen et al further teach that convolution in time domain is equivalent of multiplication in frequency domain (see page 186). Therefore convolving the weights in time domain as taught by Ketchum is functional equivalent of multiplying the weight in frequency domain as described in the specification. Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to use frequency domain multiplication instead of time domain convolution of Ketchum. The motivation of suggestion to do so is to reduce the transmitter complexity. The combination of Ketchum and Kamen et al does not expressly teach the does not rely on feedback. However in analogous art, Barry et al teach a waterpouring system that uses no feedback (see paragraphs 28 and 33) . Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to have a system does not rely on feedback. The motivation or suggestion to do so is to increase usable data rate.

Regarding claim 16, which inherits the limitations of claim 15, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 2 is applicable hereto.

Regarding claim 17, which inherits the limitations of claim 15, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 3 is applicable hereto.

Regarding claim 18, which inherits the limitations of claim 15, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 4 is applicable hereto.

Regarding claim 19, which inherits the limitations of claim 15, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 5 is applicable hereto.

Regarding claim 20, which inherits the limitations of claim 15, the claimed apparatus including the features correspond to subject matter mentioned above in the rejection of claim 6 is applicable hereto.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAISON JOSEPH whose telephone number is (571)272-6041. The examiner can normally be reached on M-F 9:30 - 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. J./
Examiner, Art Unit 2611

/CHIEH M FAN/
Supervisory Patent Examiner, Art Unit 2611